



FRD ACTIVITIES REPORT

December 2006



Research Programs

UrbaNet/Urban Dispersion Program

The manuscripts "Analysis of Plume Dispersion, Decay, and Peak-to-Mean Excursions for Continuous Tracer Gas Releases in an Urban Core, Oklahoma City, JU2003" and "Analysis of Plume Dispersion Characteristics for Continuous Tracer Gas Releases in Midtown Manhattan, MID05" have completed internal FRD review and will be submitted for internal ARL review in January. (Dennis Finn, 208-526-0566)

Smart Balloon

Improvements are continually being made to the smart balloon. Testing on the improved and larger helium and ballast release valve has turned up a problem. Although the valve closed quickly and sealed tightly, the torque of the motor exceeded the capability of the gear box. The valve operated continuously (opening and closing every 3 seconds) for a few hours but failed during an overnight test. The gears were either stripped or the output shaft was broken in the final gear stage. The output torque was calculated to be between the continuous maximum and the intermittent maximum. Therefore the current delivered to the motor will need to be limited in order to keep the torque at or below the continuous maximum. The valve will then need to be tested again over an extended period of time. (Randy Johnson, 208-526-2129)

Perfluorocarbon Tracer Analysis Development

Additional tests of our newly developed perfluorocarbon tracer (PFT) analysis method were conducted this month using ambient air samples from New York City. The results demonstrated that there were no interferences at the retention times corresponding to the PFT species PDCB and PMCH. There was a weak interference associated with m-PDCH that would likely raise the detection limit for this species from less than 10 pptv to the range of about 20-30 pptv. These results also indicate that it will be possible to use this 3-tracer analysis method in real-world applications. The next step is to attempt shortening the analysis time from just under six minutes to about three minutes by using two shorter columns. (Dennis Finn, 208-526-0566)

Cooperative Research with DOE NE-ID (Idaho National Laboratory)

Emergency Operations Center (EOC)

An EOC Quarterly Assessment Specialist Drill was held on December 7, with a representative from NOAA in attendance. The DOE/NOAA budget situation was briefly discussed. The

remainder of the drill was a table-top exercise to improve the interaction of NOAA with the BEA EOC Assessment Specialists.

Other Research Activities

In early December, FRD staff met with INL representatives to discuss areas in which INL and NOAA may have common research interests. One potential area of collaboration is unmanned aerial vehicles (UAVs). INL runs a testing center that focuses on smaller, low-cost UAVs. Rather than manually controlling the aircraft with a radio link, the INL group has developed computer technology that allows the aircraft to fly autonomously on predetermined flight plans. Such an aircraft outfitted with a miniature gust probe may prove to be highly useful to NOAA for providing low-cost turbulence and air-quality measurements in the boundary layer. INL also runs a Critical Infrastructure Test Range that works on homeland security issues related to protecting physical infrastructure. This test range may prove useful to NOAA's research activities in urban dispersion modeling. (Richard Eckman, 208-526-2740 and Kirk Clawson)

After a hiatus of several months, further work has been completed that uses Bayesian statistical modeling to estimate the uncertainty in turbulence measurements. This work partly stems from the development of the ET probe, when the ET turbulence statistics were being compared with similar statistics from sonic anemometers. If one cannot put error bars on the statistics, it is difficult to determine whether two turbulence instruments are providing statistically equivalent observations. However, the approach has broader applications for interpreting turbulence measurements. In the current work, the Bayesian approach is being tested using data from the Gill sonic anemometer that is operating at INL. (Richard Eckman, 208-526-2740)

A new forecasting tool is being developed to help aid in predicting winds across the INL. This tool is based on a cluster analysis technique that was conducted at FRD several years ago. As a result of the analysis, eight unique cluster centers were found to account for over 99% of the regional wind flows surrounding the INL. The new tool matches the current wind field to the closest cluster center and applies the probabilistic percentages of when the current cluster will likely transition into another cluster over time. The tool is solely based on pattern recognition and how the current wind pattern compares to climatology. This tool is already becoming an asset and a valuable tool for FRD meteorologists. (Roger Carter, 208-526-2745, Neil Hukari, and Jason Rich)

Other Activities

Papers

Doran, J.C., K.J. Allwine, J.E. Flaherty, **K.L. Clawson**, and **R.G. Carter**: Characteristics of Puff Dispersion in an Urban Environment. *Atmos Environ*. doi:10.1016/j.atmosenv.2006.12.029

Eckman, R.M., R.J. Dobosy, D.L. Auble, **T.W. Strong**, **T. L. Crawford**: A pressure-sphere anemometer for measuring turbulence and fluxes in hurricanes. *Journal of Atmospheric and Oceanic Technology*. (In press)

Clawson, K.L., R.G. Carter, D.J. Lacroix, J.D. Rich, N.F. Hukari, R.C. Johnson, and T. Strong: Midtown Manhattan 2005 (MID05), SF₆ Atmospheric Tracer Field Tests. NOAA Technical Memorandum OAR ARL-xxx, Air Resources Laboratory, Idaho Falls, Idaho. (In ARL review)

Finn D., K. L. Clawson, R.G. Carter, J.D. Rich, K.J. Allwine, and J.E. Flaherty, 2007: Analysis of Plume Dispersion Characteristics for Continuous Tracer Gas Releases in Midtown Manhattan, MID05. (Completed FRD review)

Finn D., K.L. Clawson, R.G. Carter, J.D. Rich, C. Biltoft, K.J. Allwine, J.E. Flaherty, and M.J. Leach, 2007: Analysis of Plume Dispersion, Decay, and Peak-to-Mean Excursions for Continuous Tracer Gas Releases in an Urban Core, Oklahoma City, JU2003. (Completed FRD review)

Safety

Donna Mills discussed the NWS Winter Safety Preparedness Guide with the staff during the monthly staff meeting and gave a copy of the Guide to each staff member.

Training

Kirk Clawson and Donna Mills completed NOAA Personal Property Custodian and Accountability Officer training thru e-learning in December 2006.

Personnel

Paula Fee retired on December 31 after more than 32 years of government service. A retirement party was held for her on December 14 at the Shilo Inn. We wish her all the best in her retirement.

The Annual FRD Christmas Party was held at the office during the noon hour. A pot luck luncheon was followed by the traditional exchanging of Christmas Gifts.